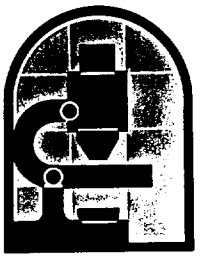


CENTER FOR INDOOR AIR RESEARCH

Request For Applications

1989-1990 Research Agenda

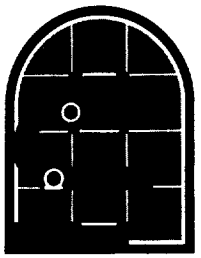
May 1989

CENTER FOR INDOOR AIR RESEARCH

Mission Statement

The mission of the Center for Indoor Air Research is to create a focal point organization of the highest scientific caliber to sponsor and foster quality, objective research in indoor air issues including environmental tobacco smoke and to effectively communicate research findings to the broad scientific community.

Science Advisory Board



CENTER FOR INDOOR AIR RESEARCH

Request For Applications

1989-1990 Research Agenda

Dear Investigator:

I am pleased to provide you the "Request for Application" for the Center for Indoor Air Research. This package includes information about the Center, the research and review process, procedures for application, the contract management process and the application forms. Also included is our Research Agenda as the Request for Application.

Applications for January 1, 1990 funding must be received by July 31, 1989, and applications for July 1, 1990 funding must be received by December 31, 1989. Please complete and return the enclosed checklist along with the contract application materials.

If you have additional questions concerning application procedures, please contact Lynn Kosak-Channing, Ph.D., Staff Scientist, at (301) 684-3777.

Thank you for your interest.

Sincerely

Max Eisenberg

Max Eisenberg, Ph.D.
Executive Director

2023587426

ACKNOWLEDGEMENT

The Center gratefully acknowledges the following for their assistance in the development of the Center's first research agenda by making presentations at the Science Advisory Board Workshop:

Dr. Mort Corn
Professor and Division Director
The Johns Hopkins University
School of Hygiene and
Public Health

Dr. Alan Hedge, Associate Professor
Department of Design and
Environmental Analysis
Cornell University

Dr. Hanspeter Witschi
Associate Director/Professor
Toxic Substances Research and
Teaching Programs
University of California

Dr. Jonathan Samet
Professor of Family, Community
and Emergency Medicine
University of New Mexico

Dr. Linda Sheldon, Manager
Methods Development and
Application Laboratory
Research Triangle Institute

Dr. Kevin Teichman
Acting Air Chief
U.S. EPA

Special thanks to Dr. Robert Frank, Director, Human Exposure Assessment Laboratory, NIEHS Center, The Johns Hopkins University.

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CENTER FOR INDOOR AIR RESEARCH

The Center for Indoor Air Research (CIAR) is a non-profit corporation formed in March, 1988 to "create a focal point organization of the highest scientific caliber to sponsor and foster quality, objective research in indoor air issues including environmental tobacco smoke, and to effectively communicate research findings to the broad scientific community".

The Center has three classes of membership: charter members, regular members and associate members (See Appendix A). The charter members are those corporations that established the Center and are currently providing the majority of the funding. Regular and associate members are those persons or corporations that are interested in indoor air quality research but were not involved in the establishment of the Center. The regular members are represented on the Board of Directors while the associate members are not. The Center is actively seeking additional members in both the regular and associate categories. Additional information on membership can be obtained by contacting the Center.

The Center has established a Science Advisory Board (SAB) which develops the research agenda for approval by the Board of Directors. The SAB recommends proposals for funding after they have been peer reviewed by the Center's pool of peer reviewers. This structure ensures that only high quality research which will contribute to the knowledge bank on indoor air is recommended for funding.

RESEARCH AND REVIEW PROCESS

The research agenda of the Center for Indoor Air Research is formulated by the Science Advisory Board (SAB), a multi-disciplinary group of individuals with reputations for expertise and scientific leadership in the disciplines relevant to indoor air research. The SAB seeks the best judgments of active research scientists as to what scientific information is missing in the various disciplines before independently ascertaining the research priorities of the Center.

After the SAB establishes the research agenda, the Center announces to the scientific community at large that research applications in response to the agenda are being accepted. The review of proposals and their selection for funding is accomplished in a scientifically rigorous and objective manner. Applications are reviewed first for scientific quality by applicant's peers whose selection is based upon recommendations from the SAB. The SAB, in turn, reviews the applications and peer evaluations, and develops recommendations on the selection of applications. Studies recommended by the SAB are subject to final evaluation and approval by the Board of Directors.

A staff scientist is assigned to each funded project to continually monitor the investigator's progress and to provide assistance to the investigators toward the successful completion of the project.

When a project is completed, the investigator submits a draft final report which is reviewed by the Center and by peer evaluators who assess the scientific quality of the project and evaluate the soundness of conclusions. The investigator is encouraged to publish the work in an independent peer-reviewed journal for the benefit of the scientific community at large.

REQUEST FOR RESEARCH APPLICATIONS

INTRODUCTION

The Center for Indoor Air Research was established in 1988, as an independent, non-profit corporation. Its primary purpose is to sponsor scientific and technical research on the sources, transformation and fate of constituents affecting indoor air quality; on factors governing human exposure to, and retention of those constituents; on the effects of those constituents on health, including exposure-response relationships; and on methods of preventing or abating indoor air contaminant concentrations. The research program will be supplemented by periodic conference workshops and commissioned monographs.

A Science Advisory Board has been assembled to assist in the formation and review of the research program. The Advisory Board consists of eminent investigators from a range of disciplines, including environmental engineering and monitoring, chemistry, toxicology, microbiology, epidemiology and biostatistics.

The following research agenda was formulated at the Center for Indoor Air Research Science Advisory Board (SAB) Workshop, held in January, 1989. It is the product of the combined efforts of the SAB (inside front cover) and prominent, active scientists with expertise in various indoor air research areas. The scientists whose names and affiliations follow, presented to the SAB their best judgments as to research needs in their respective field of expertise. The Center for Indoor Air Research acknowledges these scientists and the SAB for their intense efforts and active participation in this activity.

Dr. Mort Corn
Professor and Division Director
The Johns Hopkins University - School of Hygiene and Public Health

Dr. Alan Hedge
Associate Professor, Department of Design and Environmental Analysis
Cornell University

Dr. Morton Lippmann
Vice-Chairman, Department of Environmental Medicine
New York University Medical Center

Dr. Jonathan Samet
Professor of Family, Community and Emergency Medicine
University of New Mexico

Dr. Linda Sheldon
Manager, Methods Development and Application Laboratory
Research Triangle Institute

Dr. Kevin Teichman
Acting Air Chief, U.S. EPA

Dr. Hanspeter Witschi
Associate Director/Professor
Toxic Substances Research and Teaching Program
University of California

The Center acknowledges Dr. Robert Frank, Johns Hopkins University, for recording the Workshop discussions and composing an excellent foundation draft of the agenda.

Research topics of major interest to the Center are described in the section that follows. Individuals who intend to apply for funding are encouraged first to submit a letter of intent, two-to-three pages in length, indicating the research objectives, key elements of the experimental design and methods, estimated time required and approximate direct and indirect cost. The letters should be addressed to:

Center for Indoor Air Research
1099 Winterson Road, Suite 280
Linthicum, Maryland 21090

RESEARCH AGENDA

In the research agenda that follows, the Center's priorities and several specific requests for application are presented. This represents the Center's best judgment on currently important research problems, but the agenda is by no means exhaustive. Any proposal that is consistent with the Center's purpose, as stated in the Introduction, will be considered. Our objective in presenting priorities and specific research areas is to stimulate researchers to focus on problems related to indoor air quality.

CIAR presently assigns highest research priority to the following substances:

- **Environmental tobacco smoke (ETS), including respirable particulate and vapor-phase components.**
- **Chemical contaminants from all sources, organic and inorganic.**
- **Biological agents, including aeroallergens and aeropathogens.**

CIAR does not plan to support research on asbestos because there already is a large effort in this area funded by others.

ENVIRONMENTAL TOBACCO SMOKE

Chemistry

ETS is defined as the combination of sidestream smoke released from the burning end of a cigarette and that portion of mainstream smoke exhaled by smokers. Studies of ETS levels have been carried out largely in public buildings. Less effort has been directed to ETS in residences and commercial buildings. The constituents of ETS most commonly measured are nicotine, respirable particulate matter and carbon monoxide; however, ETS is a complex mixture of components which may interact chemically or physically, undergo aging phenomena such as agglomeration and dynamic equilibration between phases, and manifest significant spatial gradients in concentration. The resistance of ETS to analysis is largely due to its heterogeneous and dynamic nature.

Applications are requested for the following:

- Characterize the distribution of various components between the vapor and particulate phases of ETS. Since the particles generally associated with ETS are less than 1 micron in diameter, information on the distribution and chemical fate of particulate matter of this size is relevant. The measurement of indoor air components should be accomplished with methods developed to determine what fraction of the constituents are related specifically to ETS contributions.

- Studies on the chemistry during "aging" of ETS components are of interest.

- Investigate the effect of air cleaning systems on ETS, considering the different phases of ETS.

Exposure/Dose/Health Effects

A critical factor in the reliability of studies to determine the health consequences of exposures is the estimate of exposure. Measurements from site-specific and personal monitoring including biomarker measurements, have been shown to be more reliable than self-reported smoke exposure history when assessing exposures. Biological markers of tobacco smoke exposure are useful for confirming the prevalence of ETS exposure, but have limited value as indicators of the magnitude of exposure or dose. Nicotine and its metabolite, cotinine, are recognized as the most specific and sensitive markers of exposure to tobacco smoke. The presence of nicotine in body fluids reflects recent exposure as measured in hours. Cotinine, with a longer half-life in body fluids, may reflect extended exposure as measured in days.

Inaccurate reports of exposure history introduce the problem of misclassification (bias) in epidemiological studies. Additional bias is possible by misclassification of disease. For studies on ETS and lung cancer in humans, for example, it is important to define the neoplasm in precise histopathological terms. Thus, exposed and unexposed subjects must be classified not only in respect to whether or not they have developed a "lung cancer", but also whether the neoplasm is primary or secondary as well as its specific histopathological characteristics, e.g. adenocarcinoma, squamous carcinoma, etc. Furthermore, in order to reduce the degree of uncertainty in the evaluation of the results, it is essential to analyze them in terms of the specific histopathological entities of interest. For example, if 100 lung cancers in humans are studied in respect to ETS exposure, the number of primary epidermoid carcinomas observed and expected should be analyzed separately from adenocarcinomas or other types. Other important characteristics of the tumors (stage, grade, hormone-dependence, etc.) should also be analyzed. Studies should follow such protocols despite the acknowledged difficulties in assembling statistically sufficient numbers of specific lung cancer subjects for human study.

Applications are requested for the following:

- Develop a valid, reliable questionnaire for careful estimation of exposure to ETS. The questionnaire should include items about exposure to other relevant contributors to indoor air quality. The questionnaire should be designed so as to be subsequently incorporated into a study on ETS and human cardiovascular disease.

- Advance understanding of the relationship between ETS exposure and dosimetry by conducting studies to improve the use of biomarkers (such as cotinine and DNA adducts of tobacco-specific chemicals) <u>together with</u> personal exposure monitoring and health effects studies.

Important unresolved questions remain about levels of exposure to ETS and possible effects on health. This uncertainty is in part a reflection of contradictory findings among past clinical and epidemiological studies. Issues of interest to the Center include:

- Does ETS impair cardiovascular performance and contribute to the incidence of angina and myocardial infarction?

- Does ETS affect respiratory function in asthmatics and/or the normal population?

- Does ETS affect resistance to respiratory infection?

- Does ETS affect pre-natal and peri-natal development?

Studies which precisely classify clinical diseases are encouraged.

The differences which exist between ETS and mainstream smoke in the phase distribution, chemistry, and concentrations of components could influence regional uptake of the components within the respiratory system, bioavailability of the components following the uptake and health outcome.

- Develop animal and in vitro models to study the effects of ETS on:
  - cardiovascular function
  - morphometry of the lung
  - pulmonary function
  - immune and respiratory defense systems

Consideration must be given to the appropriateness of the model for extrapolating the findings to humans. Cross-species comparisons (including human material) for metabolic competence would be of value. Methods of generating realistic ETS exposures, including the monitoring of ambient concentrations and time-course of exposure, must be established. High priority is assigned to the development of models to ascertain whether or not injury and disease result from chronic, low levels of exposure and, if so, to what degree.

CHEMICAL CONTAMINANTS, ORGANIC AND INORGANIC

A myriad of chemicals exist in indoor air which have potential for affecting human health. Their sources are many (e.g., outdoor air, heating and cooling systems, building materials, electronic equipment) and their distributions are various among different indoor environments. Sources can be known or unknown. Particular chemicals might be added to heating/cooling systems to exert a biocidal or preservative effect. The chemical fate and effects of such known-source agents are not well-studied. Similarly, constituents such as volatile organic compounds, carbon monoxide and nitrogen oxides are being studied within risk assessment frameworks as toxicologically-significant compounds; however, much work remains to be done in characterizing distributions of various agents in specific environments and assessing the degree of their impacts on human health.

- Investigate the transport, chemical fate and effect on indoor air quality of chemicals added to the indoor environment.

Although there is growing agreement among researchers in the techniques used for measuring concentrations of indoor air contaminants, there remains the problem of whether or not point or time-weighted measures are most meaningful. Given a specific indoor environment with a characterizable distribution of airborne substances, are measureable health effects related to cumulative, chronic, low-level concentrations, to acute peak concentrations, and/or to synergistic effects between substances?

The importance of the indoor environment grows in significance with increased recognition that low levels of oxidants and other airborne species may mediate lung injury by effects related to cumulative dose rather than peak dose. This concept is well-established for radon, where total dose is as important as is dose pattern. The strong oxidant, ozone, has been shown to mediate lung injury at outdoor levels and in highly polluted environments. Ozone is primarily generated from the outdoor environment, but it leaks into the indoor environment from the ambient air and is produced indoors by working business machines and electronic equipment. CIAR is interested in considering creative proposals to:

- Investigate the effects of long term steady exposures to low levels of oxidants such as ozone (and other less-studied indoor air chemicals) to determine whether or not the indoor levels of these chemicals contribute to overall adverse health effects.

Although numerous chemical constituents have been identified in indoor air, little is known about the chemical changes that occur therein and the mechanisms by which they occur. The chemical fate of single species and their resulting impacts on health could vary greatly in different complex

environments. For example, does the presence of ozone, NO_2, or an aldehyde alter the clearance of particulate matter? Does the presence of airborne oxidants or inorganic complexes cause chemical changes in other components of indoor air thereby changing reactive potentials with target cells?

CIAR will consider creative proposals to:

- Elucidate interactions of low-level complex exposures.

BIOLOGICAL AGENTS

Numerous biological agents are present in indoor air which may cause human disease in many forms including immunological disorders or respiratory infections. The most common biological agents found in indoor environments are bacteria, viruses, fungal spores, algae, arthropod fragments and droppings, and dander from animals and humans. The proliferation of microorganisms is dependent on the moisture level and temperature of the environment. These requirements for growth of biological agents are often provided in homes and other environments by heating and air conditioning systems, and humidifiers.

Biological agents may cause allergenic or pathogenic responses. Indoor allergens, including those present in animal dander and arthropod fragments and droppings appear to be ubiquitous. Virtually all homes studied, whether or not pets have been present, have exhibited allergens. Such allergens are risk factors in both the development of asthma and provocation of acute asthmatic attacks. Avoidance of the allergens has been associated with improvement in the clinical status of asthma. The extent to which the risk imposed by specific allergens is determined by their aerodynamic characteristics and airborne concentrations is uncertain. A variety of microorganisms including fungi, bacteria, nematodes and amoebae have been implicated as producers of sensitizing antigens responsible for the development of immunologically mediated disease such as hypersensitivity pneumonitis. Both acute and chronic forms of this disease type may result from exposure to indoor antigens. Elevated humidity and moist surfaces promote the growth of the parent organisms. Little is known about the overall prevalence and incidence of hypersensitivity pneumonitis. The role of aeropathogens in inducing allergenic rather than pathogenic responses is an area of interest to the Center.

Research proposals are requested on the following:

- Develop sampling methods amenable to standardization for the characterization of microorganism concentrations in the indoor environment.

- Characterize the size-segregated distribution of specific antigens in various indoor environments. Attention should be paid to factors influencing the distribution of the antigen in settled dust and as airborne particles.

- Conduct highly-focused studies of aeropathogens (endogenous bacterial and fungal flora found in specific environments) which induce allergenic rather than pathogenic responses. Proposed studies in this area should be promising with respect to yielding productive, new results.

CROSS CUTTING ISSUES

CIAR assigns high priority to studies which address the effect of synergism and of chronic, cumulative, low-level exposure versus acute, peak dose exposure. These issues are relevant to all of the classes of indoor air constituents which are outlined in this agenda.

OTHER TOPICS OF INTEREST

Relevant to the research needs already stated are the areas of individual, psychosocial and occupational influences on human responses to indoor air quality, and of strategies to control measurable concentrations of air contaminants or perceived levels of discomfort attributed to the presence of air contaminants.

In many cases, investigators have been unable to identify specific atmospheric contaminants in buildings where occupants have reported chronic health complaints. Although a large effort has been devoted to and considerable progress made in the development of chemical measurement technology, little attention has been paid to quantifying human responses to indoor air environments. Studies to date have shown that worker health in office buildings is strongly influenced by many individual and perceptual factors.

CIAR requests applications for research on the following:

- Elucidate the role of individual, perceptual, occupational and psychosocial factors in mediating the effects of indoor air quality on health.
- Develop statistically sound sampling strategies for surveying building occupants.
- Develop improved self-report measures and interview techniques to assess health problems and contributing factors affecting building occupants.

Though relatively little scientific effort has been devoted to the improvement of indoor air quality, the decrease of indoor contaminants most probably will lead to reduction of adverse health effects. Control strategies follow either a pro-active course of action that prevents the generation of indoor air contaminants, or a post-active approach that reduces indoor contaminant concentrations.

Applications are requested for:

- Evaluation of the control effectiveness of air cleaning systems for reducing the concentrations of particulate matter, gaseous contaminants, and odors in indoor air.

- Develop strategies that control either indoor comfort parameters or indoor air quality parameters, or both. Strategies that enhance the welfare of occupants (comfort parameters) and their health (indoor air parameters) are preferred to controls that address one or the other.

APPLICATION PROCEDURES

LETTER OF INTENT: Prospective applicants are asked to submit a two to three page letter of intent, which should include a synopsis indicating the specific goal of the proposed research, the general approach to be used, and identification of all participating institutions and an estimate of the total that will be requested. Confidential or proprietary information on methodologic details should not be included in the letter of intent. This letter should be received no later than thirty (30) days prior to the deadline for submitting applications, at the following address:

Lynn F. Kosak-Channing, Ph.D.
Center for Indoor Air Research
1099 Winterson Road, Suite 280
Linthicum, Maryland 21090

CIAR requests such letters in order to plan the proposal review process. The letter of intent is not binding on CIAR or the applicant. In some instances, CIAR will notify the applicant if a full application is warranted or not.

FORMAT: Applications must be submitted on the attached "Application for CIAR Research Contract". Investigators should consult Application for CIAR Research Contract General Information and Instructions found on pages 18 to 22. Inquiries regarding application procedures and review procedures may be directed to Dr. Channing at the above address or by calling (301) 684-3777. If two applications are interdependent or closely related, they should be appropriately cross-referenced in the project plan.

TEN COPIES OF THE ABSTRACT AND TWELVE COPIES OF THE APPLICATION (INCLUDING ABSTRACT) ARE NEEDED BY CIAR FOR THE REVIEW PROCESS.

DEADLINES: Applications for January, 1990 funding must either reach the office of the Center for Indoor Air Research by July 31, 1989 or be sent by Express Mail or other air express carrier dated by the carrier not later than July 31, 1989. Proposals not meeting these deadlines will be held for the next funding cycle.

MANAGEMENT OF RESEARCH CONTRACTS

Research Agreements

The Center for Indoor Air Research awards contracts, not grants, on a yearly basis. We anticipate that an award will be for the number of years approved by the Board of Directors if work is progressing satisfactorily. The Research Contract has been designed to maximize the integrity of the scientific process while providing needed protections and meeting applicable regulations. An important part of the CIAR Research Contract is the Statement of Work, which contains a description of the work to be performed in each contract year in sufficient detail that it can be understood without reading the proposal.

Quality Assurance Program

It is the policy of the Center for Indoor Air Research to require that appropriate quality assurance (QA) procedures are in place for all approved research projects that include human exposure studies and certain designated animal studies. This assures our sponsors and the public that the data are of documented quality. If a QA plan is required for an approved research project, the investigator will be informed by CIAR's Executive Director. The principal investigator has the primary responsibility for development and implementation of the QA plan. If a quality assurance officer is not provided by the institution in which the research project is being carried out, the principal investigator will assign a qualified individual to serve in this capacity. The QA officer is responsible for overseeing the implementation of the quality assurance plan and reports to CIAR's Executive Director. He or she may conduct periodic audits to ascertain compliance with the QA plan.

Progress Reports

One of the means by which CIAR keeps informed of the progress of the studies that it supports is through the semiannual progress reports. Investigators are required to submit progress reports at five months and ten months of each contract year, except for the last year of the project, when the final report is substituted for the usual ten-month report. These reports are reviewed by the project monitor.

The basic objective of the five-month report, particularly in the first year, is to indicate how much progress has been made in the development of experimental procedures, which objectives have been completed, and what problems, if any, have arisen. The ten-month report is actually a combined progress report and renewal application for the next

year's funding. CIAR's decision regarding renewal of the contract is based upon the information provided by the investigator in this report. The ten-month report should provide a detailed account of experimental results obtained during the funding period, as well as a discussion of specific objectives for the coming year.

Site Visits

CIAR staff (project monitor) usually conducts site visits to the laboratories of its funded investigators midway through the project period. The purpose of these visits is to evaluate the status of the project, to provide the investigator with expert technical advice, and to provide an opportunity for an exchange of ideas between the investigator and other experts in the field.

Final Report

CIAR has as one of its goals the publication of research reports of the highest scientific quality, reports that will be of value to scientists, regulators, government officials, and the interested public.

When a study is completed, the investigator prepares a final report, which describes the study and its findings. The investigator's draft final report is peer reviewed by persons who represent a broad range of experience in addition to the project monitor. The objective of the CIAR review process is to ensure that the Investigator's Report is complete, precise, and understandable.

To accomplish these objectives, each Investigator's Report is peer-reviewed by scientists with appropriate technical expertise. The comments of the peer-reviewers are sent to the investigator, who has an opportunity to respond to these comments and, if necessary, to revise his or her report.

Publications

It is the policy of the Center that investigators are encouraged to publish results of research conducted under CIAR funding in the open scientific literature. A statement acknowledging CIAR support should appear in all publications resulting from work funded by CIAR.

> *"Research described in this article is conducted under contract to the Center for Indoor Air Research."*

Copies of all journal articles, abstracts, and review articles describing CIAR-funded research should be sent to the Center.

CONTRACT ADMINISTRATION POLICY

Payments will be made at the beginning of each quarter to the institution where the research is being conducted. A payment schedule other than quarterly must be requested and approved by the Center prior to commencement of a contract. Payments are made upon receipt of an invoice from the institution.

Contracts may not be transferred from one institution to another due to a change in affiliation by principal investigator without express permission of the Center.

A Contract may be terminated prior to normal expiration date by the contractor upon notification to the Center with a statement of reasons for termination.

Unexpended funds shall be returned to the Center for Indoor Air Research either upon expiration or termination of the project.

Budgets are presumed accurate at the time of award; however, up to 20% of the funds may be reapportioned among all categories except for travel without prior approval. If, for any unforseen reasons, additional funds or reapportionments exceeding 20% are required, such requests will be considered by the Center upon receipt of a complete statement of reasons for such change. **PLEASE NOTE**: If funds are reapportioned into category (e), equipment, it will result in a subsequent reduction in category (i), indirect costs, and thus, a reduction in the total project award.

APPLICATION FOR CIAR RESEARCH CONTRACT

General Information and Instructions

Submission of Applications

Complete applications received by the following deadline dates will be reviewed as indicated:

Applications Received by	Funding Date
December 31st	July 1st
July 31st	January 1st

Investigators are encouraged, however, to submit their applications at any time during the year. Late applications will not be reviewed until the next review cycle.

Submit the original and eleven additional copies. If photographs are included, send two original sets. All copies must have holes punched to fit a standard 3-ring binder. Submit ten additional copies of Research Abstract form.

Append as much material as required. Type, single space, use 8 1/2 x 11" width paper and label each sheet with the name of the Principal Investigator in the upper right hand corner. Number each page consecutively beginning with page 6. DO NOT insert pages between pages 1-5.

Investigators will receive written acknowledgement of receipt of the application.

Research Plan

Organize sections 8-11 of the Research Plan to answer these questions. (A) What do you intend to do? (B) Why is the work important? (C) What have you and others already done? (D) How are you going to do the work?

Research Plan (continued)

8. Specific Aims

State the broad, long-term objectives and describe concisely and realistically what the specific research described in this application is intended to accomplish and any hypotheses to be tested.

9. Significance

Briefly sketch the background to the present proposal, critically evaluate existing knowledge, and specifically identify the gaps which the project is intended to fill. State concisely the importance of the research described in this application by relating the specific aims to the broad, long-term objectives.

10. Preliminary Studies

Use this section to provide an account of the principal investigator/program director's preliminary studies pertinent to the application and/or any other information that will help to establish the experience and competence of the investigator to pursue the proposed project.

11. Experimental Design and Methods

Outline the experimental design and the procedures to be used to accomplish the specific aims of the project. Include the means by which the data will be collected, analyzed, and interpreted. Include a description of the statistical methods to be used for analysis and interpretation of the data. Describe the proposed statistical procedures with sufficient detail to allow evaluation by a biostatistical reviewer. Describe any new methodology and its advantage over existing methodologies. Discuss the potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. Provide a tentative sequence or timetable for the investigation. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. Include a timetable for the investigation (i.e., a columnar or graphical representation of your schedule for completion of tasks) in order for the project monitor to more closely follow the progress of the study, and a list of literature you cited in your application.

13. Budget

Cost Data: Provide adequate data and analysis to assure the Center that the proposed costs are reasonable and that adequate accounting procedures will be used. CIAR has no specific limitation on the budgets of research proposals. Most contracts are expected to be in the range of $50,000 to $200,000 per year, including overhead. Projects requiring larger budgets must have exceptional promise for developing important methods or information for understanding indoor air pollution.

Personnel: List the names and positions of all applicant organization personnel involved in the project, both professional and nonprofessional, whether or not salaries are requested. Estimate the percentage of time or effort on the project for professional personnel and non-professional personnel. List the dollar amounts separately for each individual for salary and fringe benefits. Fringe benefits may be requested to the extent that they are treated consistently by the applying organization as a direct cost to all sponsors.

The amount to be reimbursed to each individual, when added to his or her compensation for all other full-time duties, should not exceed the individual's base salary. The base salary for the purposes of computing charges to a CIAR Research Agreement excludes income that an individual may be permitted to earn outside of full-time duties to the applicant organization.

Consultant Costs: Consultant service should be explained by indicating the specific area in which such service is to be used. Identify the contemplated consultants. State the number of days of such services estimated to be required and the consultant's quoted rate per day.

Equipment: If special-purpose equipment is being proposed, provide a description of the items, details of the proposed cost including competitive prices. If fabrication by the applicant is contemplated, include details of material, labor, and overhead.

Alterations and Renovations: If the costs of essential alterations of facilities, including repairs, painting, removal or installation of partitions, shielding, or air conditioning, are requested, itemize them by category and justify them fully. When applicable, indicate the square footage involved, giving the basis for the costs, such as an arthitect's or applicant's detailed estimate. When possible, submit a line drawing of the alterations being proposed.

Supplies and Other Expenses: All supplies and other expenses should be itemized in sufficient detail to allow reviewers to understand the major categories of expenditures (i.e., animals, glassware, media chemicals, as well as publication costs, page charges, and books, listed by category and unit cost). Itemize and justify such items as patient travel and per diem costs, rentals, leases, and computer costs. Unusually expensive items for special processes should be separately identified by quantity and price and the use or application thoroughly explained in the project plan. Each individual expense item must be categorized as supplies or other expenses according to the practices of the accounting office of your institution.

Travel Expenses: Indicate the estimated number of trips required, destination, reason for travel, and cost. Identify and support any other special transportation costs attributable to the performance of this project. CIAR pays for foreign travel only if it is approved in advance of the trip.

Subcontracts: Itemize and enter a total for these costs. Describe and justify all appropriate costs for services purchased for, or associated with, third parties, including applicable indirect costs. These costs may include, but are not necessarily limited to, consortium arrangements or formalized collaborative agreements. Develop separate budgets for the initial and future budget period for each organization involved in consortium arrangements or formalized collaborative agreements, and submit them in six sets as an appendix to the application.

Indirect Costs: Ordinarily indirect costs are limited to a maximum of 25 percent.

Human Subjects

The Center requires that Institutional Review Board approval for any procedures involving human subjects must be submitted with the application; otherwise, it will not be reviewed.

Laboratory Animals

The Center endorses the NIH policies on the care and use of laboratory animals, and requires that any proposed experiment involving the use of experimental animals be approved by the Institutional Animal Care and Use Committee at the investigator's institution. Documentation of approval by the local animal care committee will be required before any proposed contract will be reviewed.

Research Abstract

A concise descriptive summary of the project must be submitted with the application. A form is provided for this purpose.

Completeness to Applications

Provide all information requested. The signature and typed names of the institutional officer and principal investigator must be on the application.

Notification After Review of Application

Investigators will be notified, in writing, of the decision on their proposal within eight weeks.

CIAR CHECKLIST FOR RESEARCH CONTRACT APPLICATION

Please complete all items or write N/A (not applicable).
This checklist must accompany your completed application.

I. APPLICATION (must contain all parts assembled in the following order)

_____ Pages 1-4 of application including:

_____ Signature of institutional officer (#7d)

_____ Detailed budget for first 12 month period, and estimated subtotals for second and third periods (#12a - 12e)

_____ Institution's current Fringe Benefit rate (#12a)

_____ Signature of Principal Investigator (#16)

_____ Research Abstract

II. APPEND

_____ Research Plan - Aims, Significance, Preliminary Studies and Experimental Plan (#8-11)

_____ Available facilities and resources (#12)

_____ Budget Justification - detail specific needs for first 12 month period (#13)

_____ Consent letter from consultant(s) (#13b)

_____ Biographical sketch of all professional personnel listed in 12a (#14)

_____ Institutional Review Board approval for procedures involving human subjects (#15a)

_____ Institutional Animal Care and Use Committee approval for procedures involving animals (#15b)

_____ Two original sets of photographs

II. APPEND (continued)

Append as much material as required. TYPE, single space, use 8 1/2" x 11" width paper and label each sheet with name of the Principal Investigator in upper right corner and page number at the bottom. Consecutively number each addendum beginning with page 6. Do not insert pages between pages 1 and 5, e.g., 2a, 2b, 3a, 3b, etc.

III. MAILING INSTRUCTIONS

Include eleven copies and an original of each and every part of the application, plus ten additional copies of the Research Abstract form. NOTE: All eleven copies must have holes punched to fit a standard 3-ring binder. The original should not have any holes punched in it. Together with the checklist mail the application to:

Center for Indoor Air Research
1099 Winterson Road, Suite 280
Linthicum, Maryland 21090

CENTER FOR INDOOR AIR RESEARCH

1099 WINTERSON ROAD
SUITE 280
LINTHICUM, MD 21090
(301) 684-3777
FAX (301) 684-3729

APPLICATION FOR RESEARCH CONTRACT

1. PRINCIPAL INVESTIGATOR. Name, title, telephone # and mailing address.

(a)_____ (b)_____ (c)_____
Name Title Telephone number

(d)_____ (e)_____
Department Institution

(f)_____ (g)_____
Mailing Address State/Zip

2. PROJECT TITLE. (Do not exceed 75 typewriter spaces inclusive of spaces between words and punctuation.)

3. KEY WORDS. Please provide three (3) key words which will be used as reference headings.

4. INSTITUTION. Name and address of institution responsible and accountable for disposition of funds awarded on the basis of this application.

(a)_____ (b)_____
Institution Street Address

(c)_____ (d)_____
City State/Zip

5. LOCATION. List location where research will be conducted *if other than institution identified in #4 above.*

(a)

(b)

6. INCLUSIVE DATES and TOTAL COSTS of this specific project related to each 12 month period if more than one year is required to complete project. Summarize from budget page, item 13(j). It must be understood that awards for 2nd and 3rd periods are dependent on Science Advisory Board review and Center approval of continuation application.

	Inclusive Date			**Total Cost**
(a) 1st 12 month period if required	_____	thru	_____	$ _____
(b) 2nd 12 month period	_____	thru	_____	$ _____
(c) 3rd 12 month period	_____	thru	_____	$ _____

7. INSTITUTIONAL OFFICER. Name, title and telephone # of individual authorized to sign for the institution identified in #4 above. It is understood that the officer, in applying for a contract, has read and found acceptable the Center's Management of Research Contracts and Contract Administration Policy.

(a)_____ (b)_____
Name Title

(c)_____ (d)_____ (e)_____
Telephone Signature of institutional officer Date

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8. AIMS*. Please be specific.

(a) Hypothesis

(b) Objectives

9. SIGNIFICANCE OF PROPOSED WORK*

(a) Background

(b) Literature

(c) Identification of gaps in proposed research area

(d) Project importance

10. PRELIMINARY STUDIES*

(a) Feasibility of proposed research

(b) Qualifications of investigator

11. EXPERIMENTAL PLAN*

(a) Design

(b) Methods

(c) Analysis of data

(d) Interpretation of results

(e) Timetable for the investigation

(f) Literature cited

12. AVAILABLE FACILITIES AND RESOURCES

* Append as much material as required. TYPE, single space, use 8½" x 11" white paper and label each sheet with name of the principal investigator in upper right hand corner and page number at the bottom. Consecutively number each addendum beginning with page 5. Do not insert pages between pages 1 and 5, e.g., 2a, 2b, 3a, etc. include eleven copies and an original. If sending photographs, include 2 original sets.
Note: All eleven copies *must* have holes punched to fit a standard 3-ring binder.

13. BUDGET. Detail specific needs for first 12-month period. Estimate category sub-totals for 2nd and 3rd periods, if required. Append justifications.

		$ 1st period	$ 2nd period	$ 3rd period
(a) Salaries, List personnel by name and title. Indicate individuals % time to be spent on this project.				
%	Professional:			
	Technical:			
	Other:			
	Fringe benefits payable at institution's rate of _____%			
	Category (a) Sub-Total	$	$	$
(b) Consultants (per diem, travel & expenses):				
	Category (b) Sub-Total	$	$	$
(c) Supplies & Expense: Consumables (by category)				
	Animals and related costs			
	Other expenses (itemize)			
	Category (c) Sub-Total	$	$	$
(d) Travel & Expenses:				
	Category (d) Sub-Total	$	$	$
(e) Alterations and Renovations				
	Category (e) Sub-Total	$	$	$
(f) Sub-contracts				
	Category (f) Sub-Total	$	$	$

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(g) Equipment	Category (g) Sub-Total	$	$	$
(h) TOTAL DIRECT COSTS		$	$	$
(i) Indirect costs not to exceed 25% of the	sum of (a) thru (f):	$	$	$
(j) TOTAL PROJECT COSTS		$	$	$

14. BIOGRAPHICAL SKETCH of all professional personnel listed in 13(a). Append. Please include the following: Name, title, education, scientific field, major research interest, research and/or professional experience and publications. (Limit list of publications to the 20 most important and/or relevant.)

15. a) Are HUMAN SUBJECTS to be used in this research? _____ Yes _____ No

If yes, attach Institutional Review Board approval for procedures involving human subjects.

b) Are LABORATORY ANIMALS to be used in this research? _____ Yes _____ No

If yes, attach Institutional Animal Care and Use Committee approval for procedures involving animals.

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16. SIGNATURE OF PRINCIPAL INVESTIGATOR. It is understood that the applicant in applying for a Contract has read and found acceptable the Center's "Statement of Policy and Terms Under Which Project Contracts Are Made."

_____ Date_____

Signature of Principal Investigator

rev. 2/89

RESEARCH ABSTRACT

Title of Project:

Investigator(s):

Institution:

ABSTRACT: In the space below, please provide a descriptive summary of your proposed research project.

Signature, Principal Investigator _____ Date _____

OMB No. 0925-0637

DEPARTMENT OF HEALTH AND HUMAN SERVICES

PROTECTION OF HUMAN SUBJECTS ASSURANCE/CERTIFICATION/DECLARATION

☐ ORIGINAL ☐ FOLLOWUP ☐ EXEMPTION (previously undesignated)

☐ GRANT ☐ CONTRACT ☐ FELLOW ☐ OTHER

☐ New ☐ Competing continuation ☐ Noncompeting continuation ☐ Supplemental

APPLICATION IDENTIFICATION NO. *(if known)*

POLICY: A research activity involving human subjects that is not exempt from HHS regulations may not be funded unless an Institutional Review Board (IRB) has reviewed and approved the activity in accordance with Section 474 of the Public Health Service Act as implemented by Title 45, Part 46 of the Code of Federal Regulations (45 CFR 46–as revised). The applicant institution must submit certification of IRB approval to HHS unless the applicant institution has designated a specific exemption under Section 46.101(b) which applies to the proposed research activity. Institutions with an assurance of compliance on file with HHS which covers the proposed activity should submit certification of IRB review and approval with each application. (In exceptional cases, certification may be accepted up to 60 days after the receipt date for which the application is submitted.) In the case of institutions which do not have an assurance of compliance on file with HHS covering the proposed activity, certification of IRB review and approval must be submitted within 30 days of the receipt of a written request from HHS for certification.

1. TITLE OF APPLICATION OR ACTIVITY

2. PRINCIPAL INVESTIGATOR, PROGRAM DIRECTOR, OR FELLOW

3. FOOD AND DRUG ADMINISTRATION REQUIRED INFORMATION *(see reverse side)*

4. HHS ASSURANCE STATUS

☐ This institution has an approved assurance of compliance on file with HHS which covers this activity.

_____ Assurance identification number _____ IRB identification number

☐ No assurance of compliance which applies to this activity has been established with HHS, but the applicant institution will provide written assurance of compliance and certification of IRB review and approval in accordance with 45 CFR 46 upon request.

5. CERTIFICATION OF IRB REVIEW OR DECLARATION OF EXEMPTION

☐ This activity has been reviewed and approved by an IRB in accordance with the requirements of 45 CFR 46, including its relevant Subparts. This certification fulfills, when applicable, requirements for certifying FDA status for each investigational new drug or device. *(See reverse side of this form.)*

_____ Date of IRB review and approval. *(If approval is pending, write "pending." Followup certification is required.)*
(month/day/year)

☐ Full Board Review ☐ Expedited Review

☐ This activity contains multiple projects, some of which have not been reviewed. The IRB has granted approval on condition that all projects covered by 45 CFR 46 will be reviewed and approved before they are initiated and that appropriate further certification *(Form HHS 596)* will be submitted.

☐ Human subjects are involved, but this activity qualifies for exemption under 46.101(b) in accordance with paragraph _____ *(insert paragraph number of exemption in 46.101(b), 1 through 5)*, but the institution did not designate that exemption on the application.

6. Each official signing below certifies that the information provided on this form is correct and that each institution assumes responsibility for assuring required future reviews, approvals, and submissions of certification.

APPLICANT INSTITUTION	COOPERATING INSTITUTION
NAME, ADDRESS, AND TELEPHONE NO.	NAME, ADDRESS, AND TELEPHONE NO.
NAME AND TITLE OF OFFICIAL *(print or type)*	NAME AND TITLE OF OFFICIAL *(print or type)*
SIGNATURE OF OFFICIAL LISTED ABOVE *(and date)*	SIGNATURE OF OFFICIAL LISTED ABOVE *(and date)*

HHS 596 (Rev. 1/82)

(If additional space is needed, please use reverse side under "Notes.")

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3. FOOD AND DRUG ADMINISTRATION REQUIRED INFORMATION *(from front side)*

According to 45 CFR 46.121, if an application is made to HHS requiring certification and involving use of an investigational new drug or device, additional information is required. In addition, according to 21 CFR 312.1(a)(2), 30 days must elapse between date of receipt by FDA of Form FD-1571 and use of the drug, unless the 30 day delay period is waived by FDA.

3a. INVESTIGATIONAL NEW DRUG EXEMPTION *(if more than one is involved, list others below under NOTES):*

SPONSOR NAME

DRUG NAME

DATE OF END OF 30-DAY EXPIRATION OR WAIVER	NUMBER ISSUED

3b. INVESTIGATIONAL DEVICE EXEMPTION:

SPONSOR NAME

DEVICE NAME

Unless notified otherwise by FDA, under 21 CFR 812.2(b) (ii) a sponsor is deemed to have an approved IDE if: (1) the IRB has agreed with the sponsor that the device is a nonsignificant risk device; and (2) the IRB has approved the study. *(Check applicable box.)*

☐ The IRB agrees with the sponsor that this device is a nonsignificant risk device.

OR

☐ The IDE application was submitted to FDA on *(date)* _____. Number issued _____.

NOTES:

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APPENDIX A

CIAR MEMBERSHIP

CHARTER MEMBERS	*Philip Morris U.S.A.*
	R.J. Reynolds Tobacco Company
	Lorillard Corporation
REGULAR MEMBERS	*Solicitation in Progress*
ASSOCIATE MEMBERS	*Consolidated Safety Services*
	ENV Services, Inc.
	Meckler Engineers Group
	Universal Corporation

CENTER FOR INDOOR AIR RESEARCH

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